# Water Management and Its Impacts to Florida Bay: Refocusing on downstream effects

Dr. Jerry Lorenz
Audubon of Florida
Tavernier Science Center

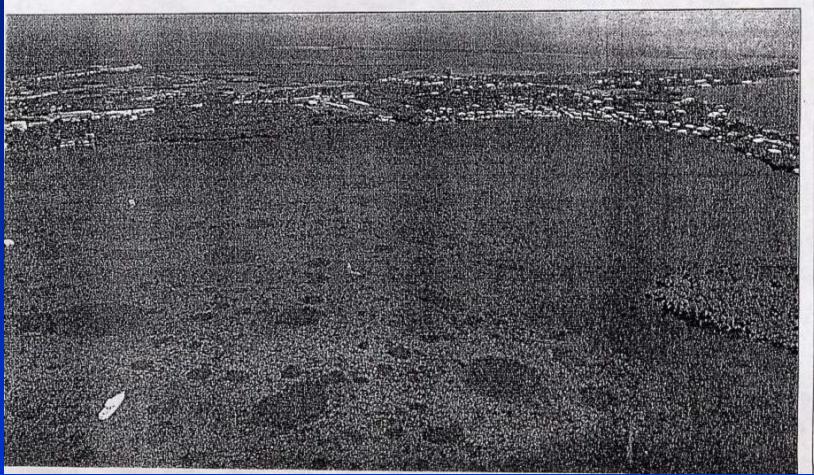
### The Miami Hera

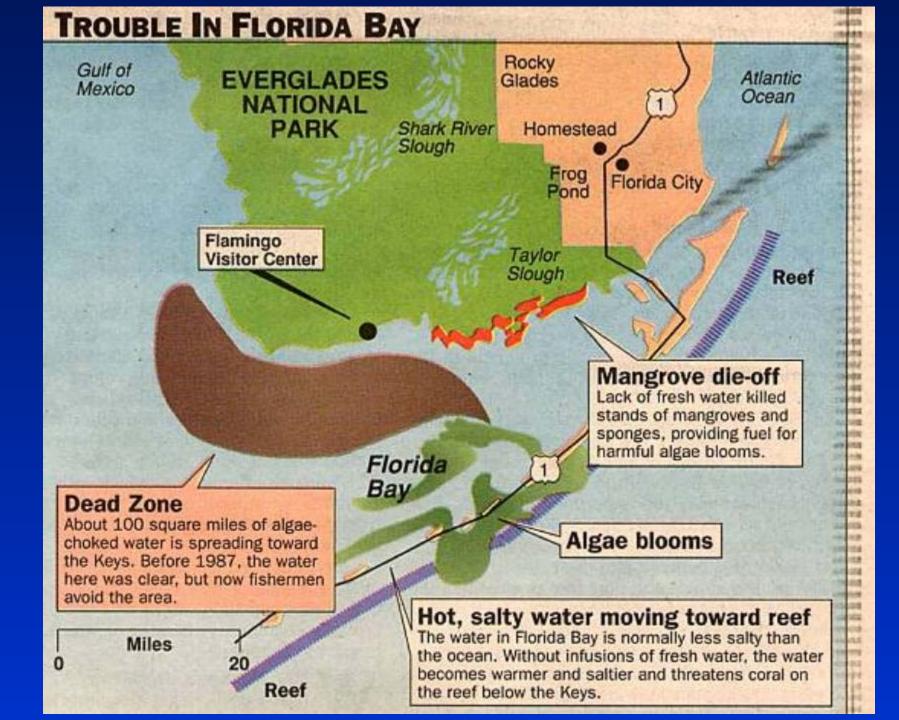
TUESDAY, AUGUST 11, 1992

CONTENTS COPYRIGHT

Florida Bay is falling apart like a rotting piece of cloth.

- JAY ZIEMAN, marine scientist

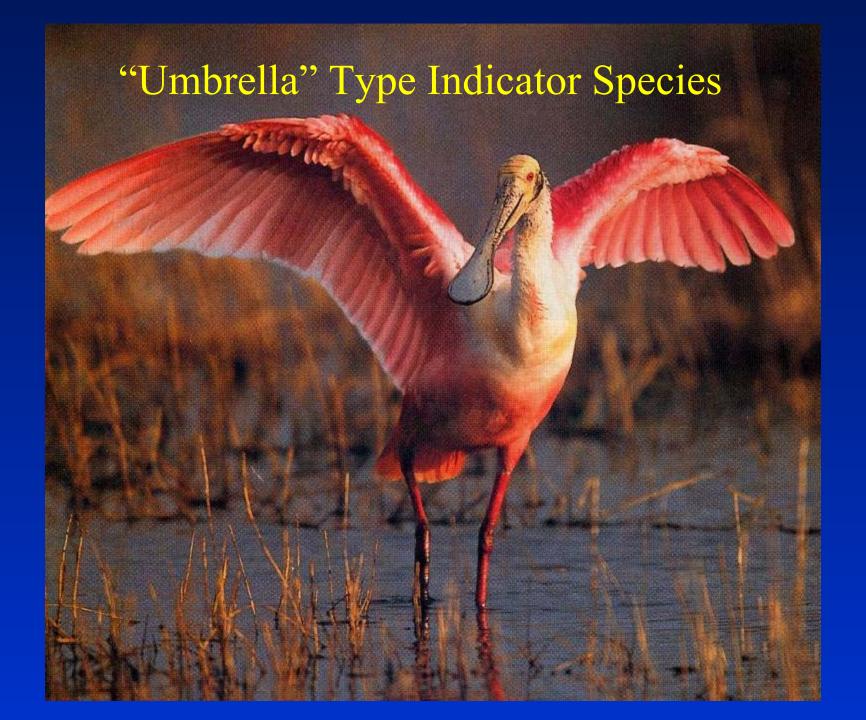






# Recent Years: Perception that Fl. Bay is Healing

- Quotes from the IOP-FEIS May 2002
  - -"Under Alt7R, the effect of pumping into seepage reservoirs from S-332D could slightly decrease stages in Taylor Slough."
  - -"The effects...are expected to reduce flows to Florida Bay during wet season months"
- Does not seem to attract too much attention











#### UNIQUE TREASURES OF THE LOWER KEYS

Pristine and undisturbed, the Lower Keys possesses its own unique identity. With the Florida Keys National Marine Sanctuary and Bahia Honda State Park, rated the nation's second most beautiful beach, the Lower Keys are taking active steps to preserve the natural beauty, as well as the history of the area. The Blue Hole, a rock quarry from railroad days, is now home to many fascinating wildlife species, some of which can be found only on these coral islands. The best known is the diminutive Key Deer. The dive wreck, Adolphus Busch Sr., along with many natural reefs in the area, offers some of the best diving in the Keys. See our feature on page 66 to learn more about places to see in the Lower Keys.

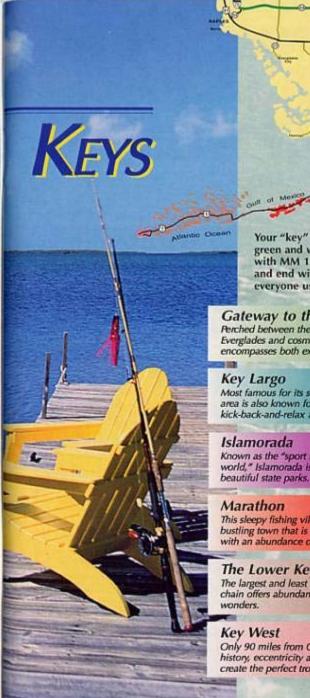


#### **DIVING & SNORKELING**

Beneath the calm blue veneer of the Gulf waters just miles off the Keys' sparkling shores lies one of the most stunning coral reefs in the world. One of the most complex and beautiful ecosystems on earth, the coral reef provides habitat for diverse forms of exotic marinelife and gives divers and snorkelers a glimpse of submerged gardens of unimaginable beauty. See page 19.

Welcome to the FLORIDA





Your "key" to traveling the Keys, these green and white mile markers (MM) begin with MM 126 one mile past Florida City and end with MM 0 in Key West. Nearly everyone uses them to give directions.

Gateway to the Keys

Perched between the subtropical splendor of the Everglades and cosmopolitan Miami, this area encompasses both extremes.

Most famous for its stunning offshore reef, this area is also known for watersports and a kick-back-and-relax attitude.

Islamorada

Known as the "sport fishing capital of the world," Islamorada is also home to a number of

This sleepy fishing village has evolved into a bustling town that is truly the "heart of the keys" with an abundance of fun family attractions.

The Lower Keys

The largest and least developed area in the island chain offers abundant wildlife and natural

Only 90 miles from Cuba and 150 from Miami, history, eccentricity and island charm mix to create the perfect tropical getaway.



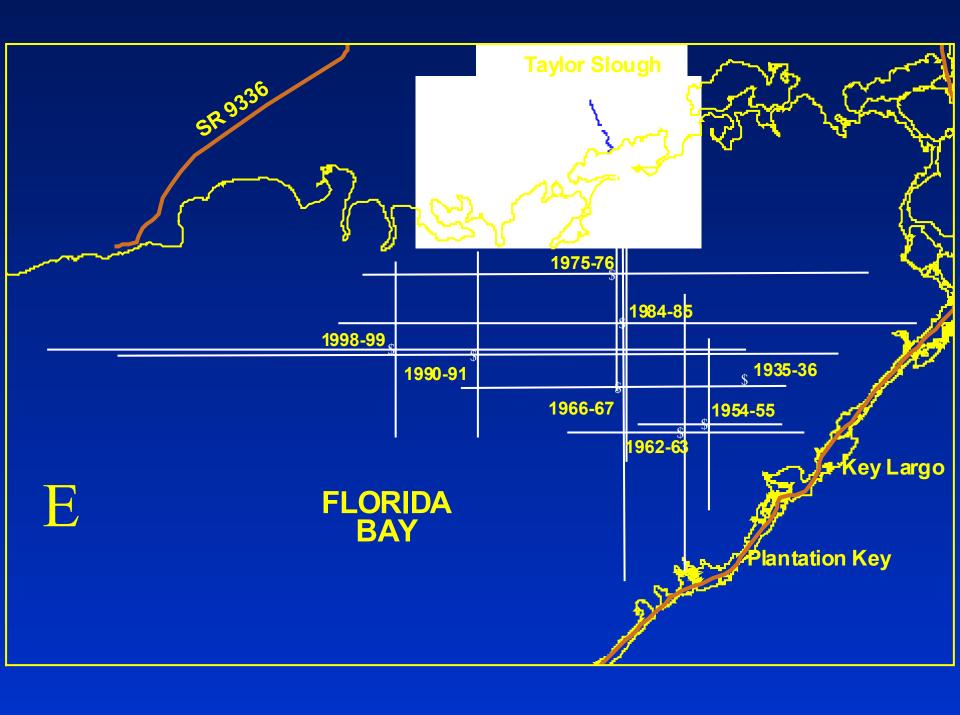


"Keystone" Type Ecological Indicator

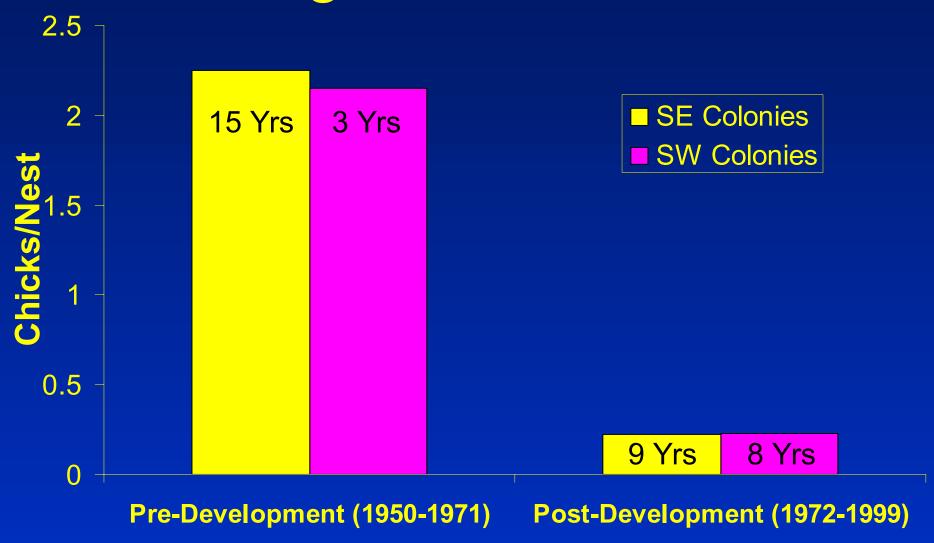






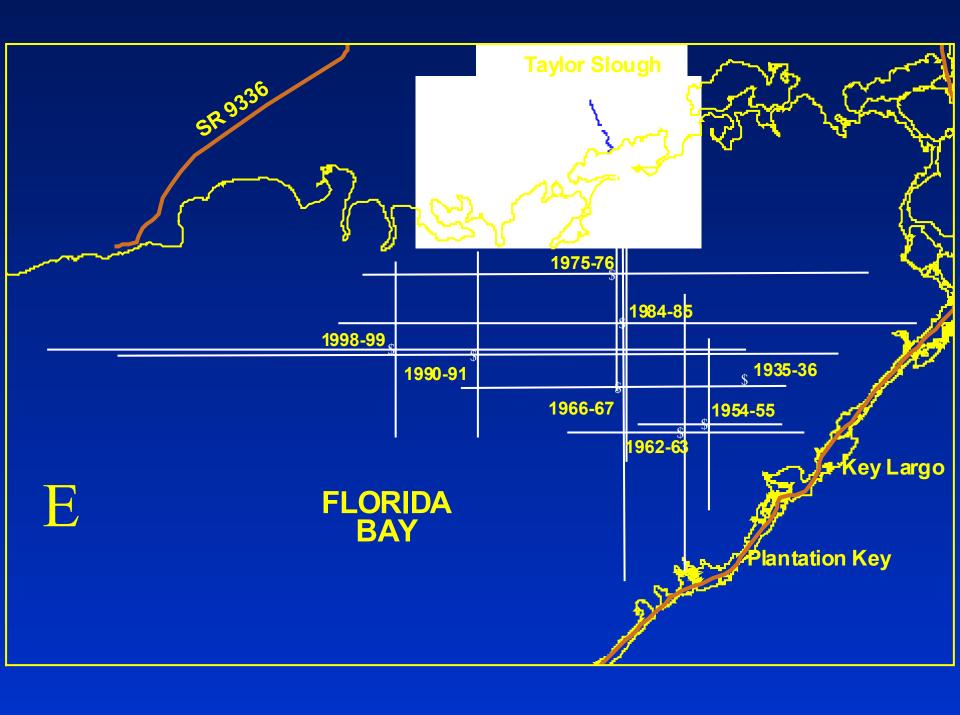


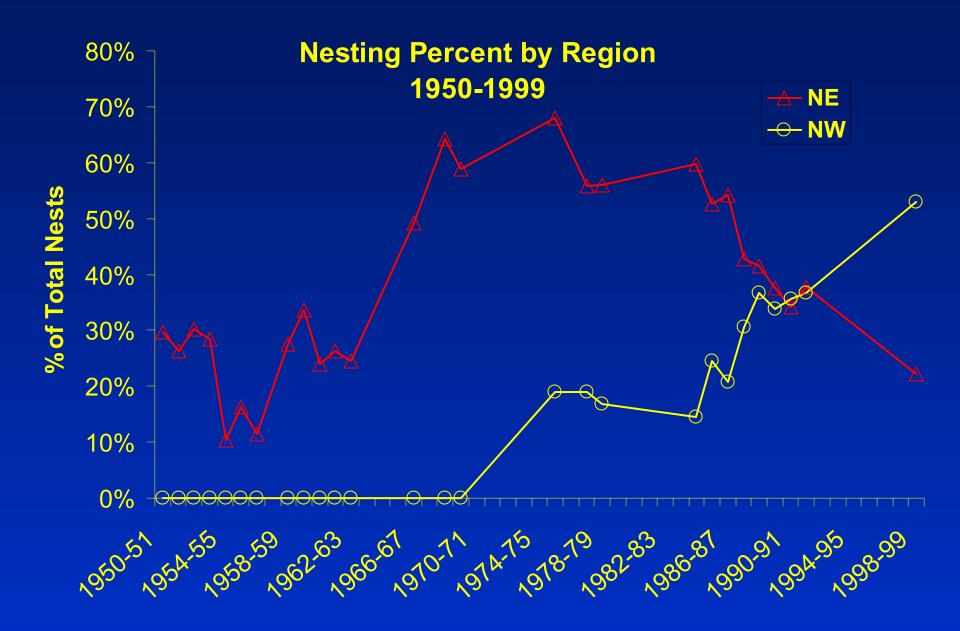
#### Average Nest Production

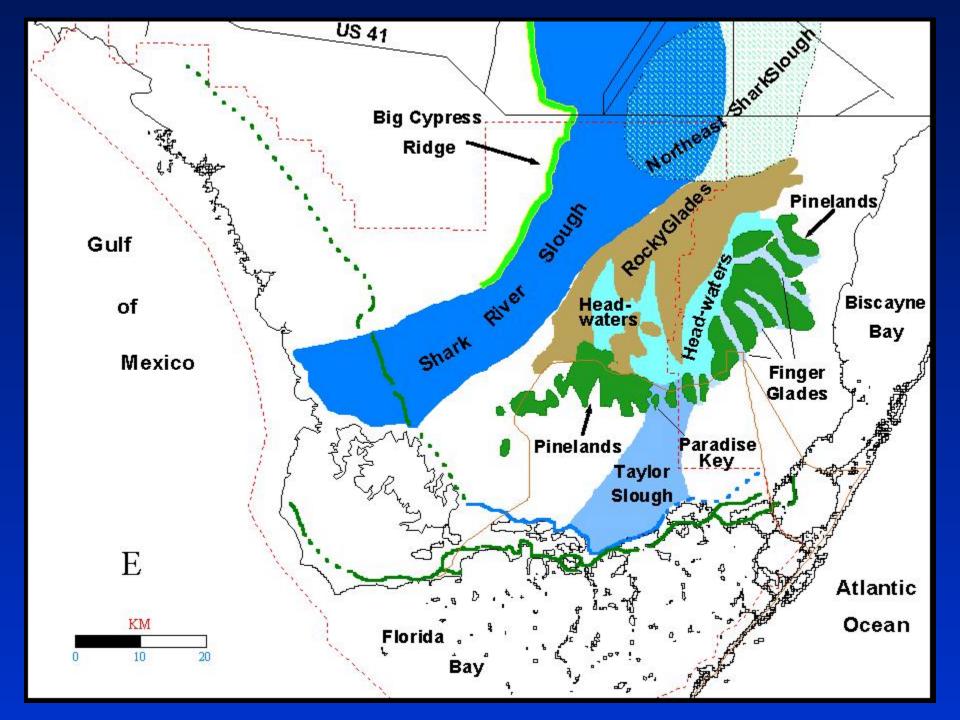


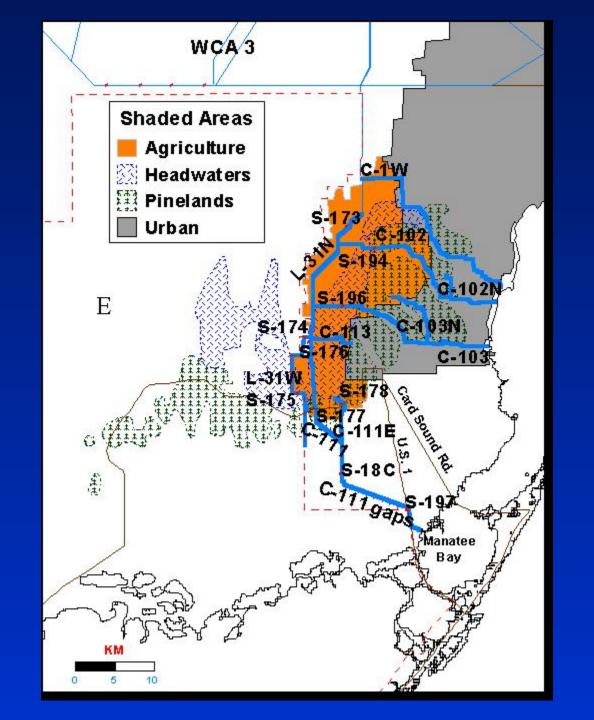
## Spoonbills Abandoned the Southern Bay by 1972

- Urban development of the Keys between 1959-1972 resulted in the loss of foraging grounds in the Keys
  - Spoonbills adjust nesting to food availability
- Resulted in
  - -a shift in nesting effort to the northern Bay
  - -a 10 fold decrease in nesting success

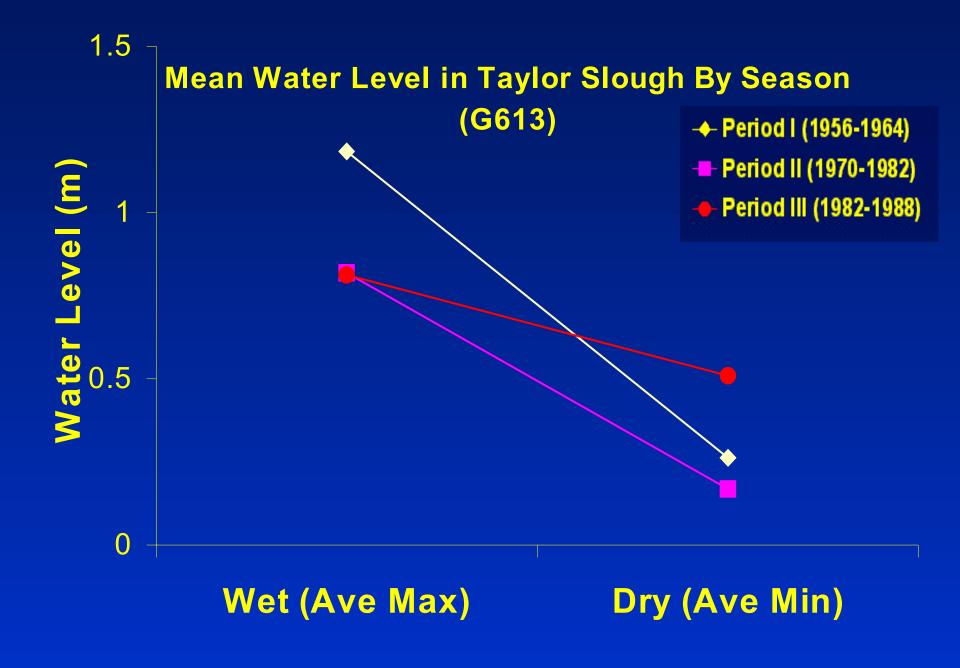








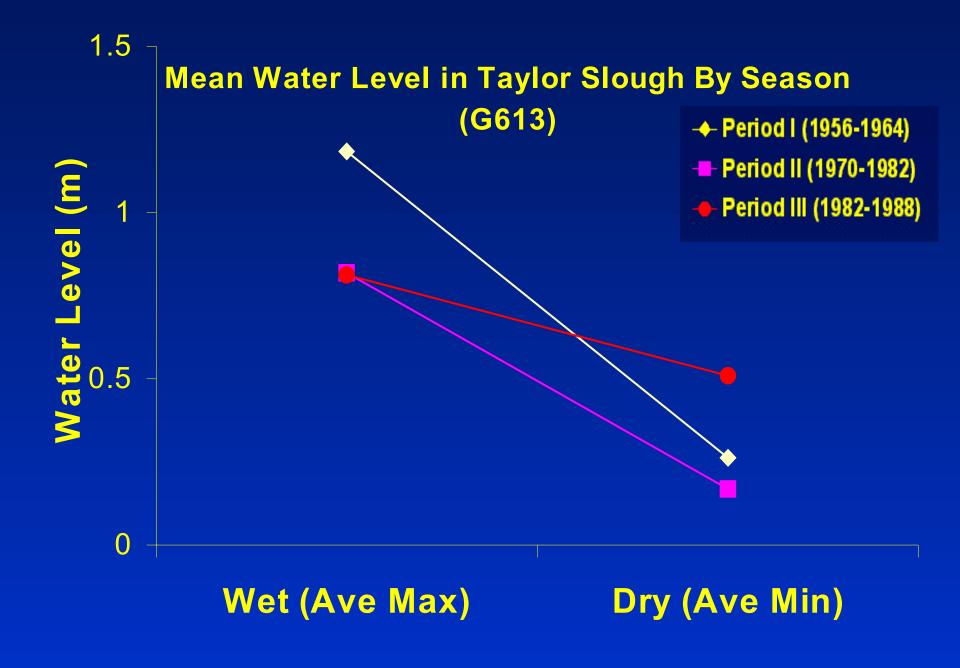






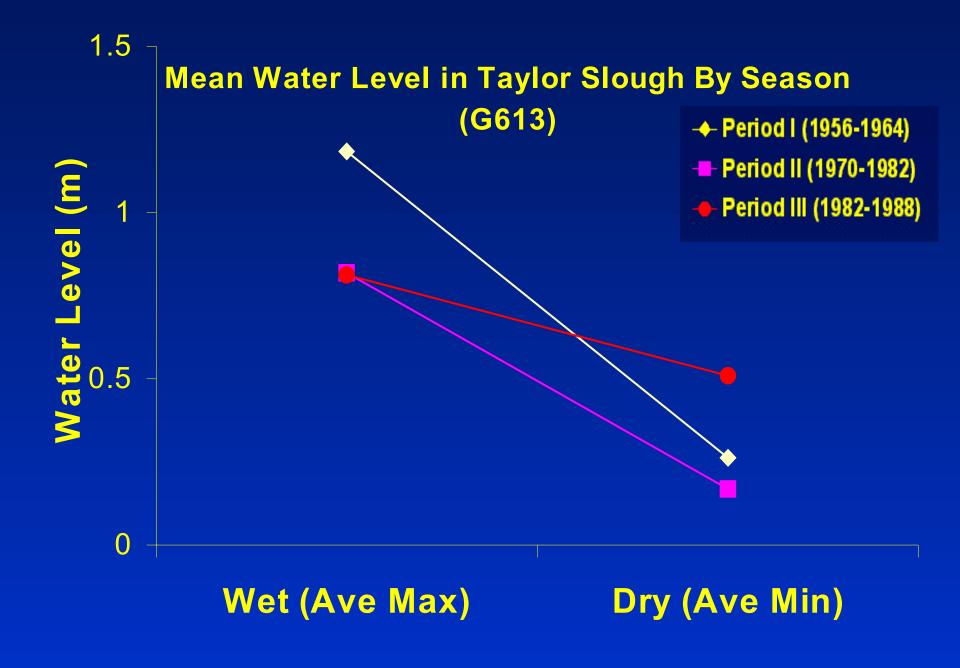
#### Period II Nest Success

	Est. Chicks Per Nest		% Dev	% Deviation	
<b>PERIOD II</b>			from	from Mean	
			Raii	Rainfall	
Year	NE	NW	Wet	Dry	
1964-65	S		-0.03	-0.27	
1965-66	S		0.07	0.07	
1966-67	1.8		0.13	-0.48	
1967-68	1.4		0.08	-0.03	
1968-69			0.27	0.07	
1969-70	2.0		0.24	0.62	
1971-72	2.0		0.05	0.13	
1973-74	1.6		0.02	-0.34	
1974-75			0.12	-0.25	
1975-76	0.8	0.5	-0.02	-0.07	
1977-78	0	F	-0.04	0.12	
1978-79	0.6	0.5	-0.05	0.27	
1979-80	0.5		-0.05	0.15	
1981-82	S	S	-0.21	-0.44	
Mean	1.38		0.04	-0.03	
%Success	71				



#### Period III Nest Success

PERIOD III	Est. Chicks Per Nest		% Deviation from Mean Rainfall	
Year	NE	NW	Wet	Dry
1982-83	0.0	S	0.14	0.42
1983-84	0.5		0.05	0.32
1986-87	0.0	0.0	-0.02	0.14
1987-88		2.5	<b>-0.02</b>	-0.21
1988-89	1.9	1.9	-0.16	-0.29
1989-90		2.4	-0.16	-0.18
1990-91	1.8	2.1	-0.10	0.40
1991-92		2.0	-0.01	-0.29
1992-93	0.0	0.0	0.16	0.22
1994-95	0.0	1.6	0.21	0.16
1995-96	0.1	0.1	0.33	0.08
1996-97	0.2	0.4	-0.15	0.03
1997-98	0.0	0.4	0.00	0.48
1998-99	0.3	1.4	0.02	-0.38
			2.25	
Mean	0.67	1.24	0.02	0.06
%Success	36	62		

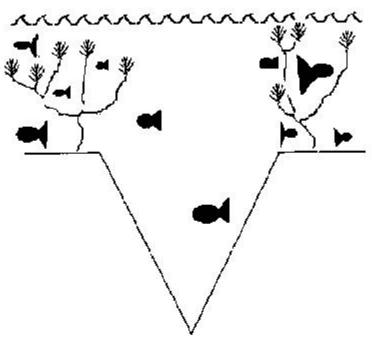


### Spoonbills Responding to Food Availability

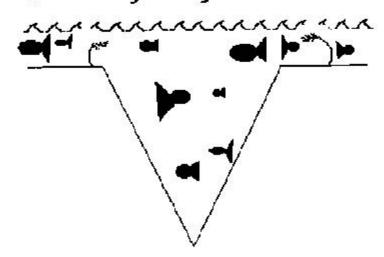
#### Water Management Impacts on Prey Fish

- Lower water levels reduced habitat for prey
- Shorter hydroperiod reduced productivity
- Higher salinity resulted in lower fish production

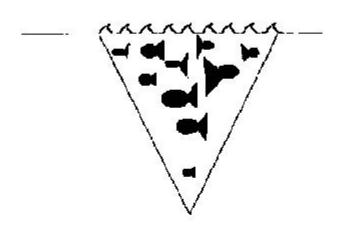
#### A. Wet Season



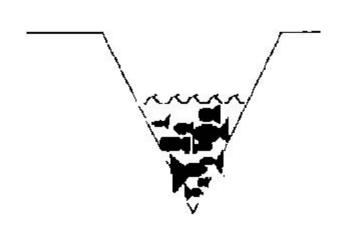
B. Early Dry Season

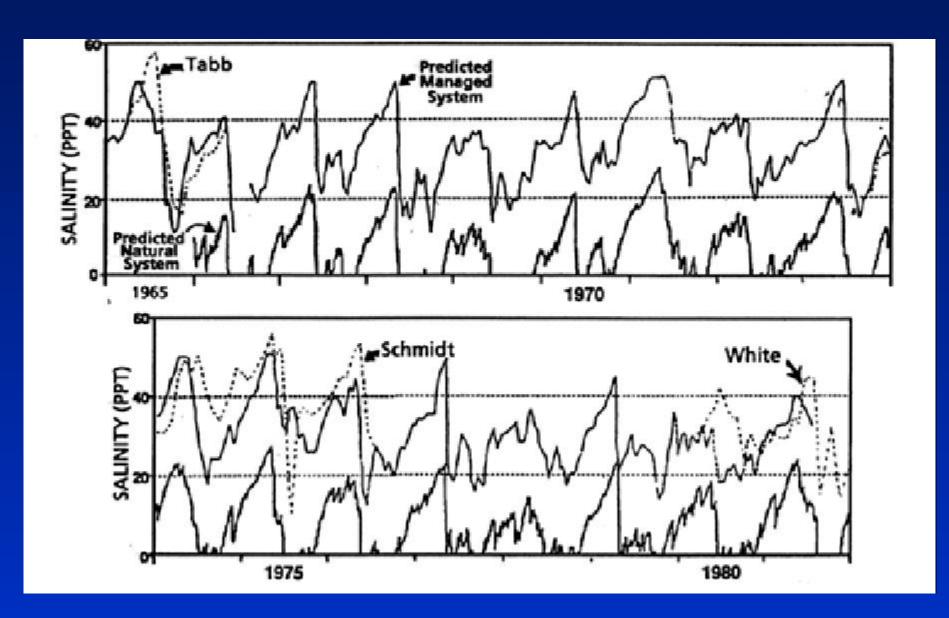


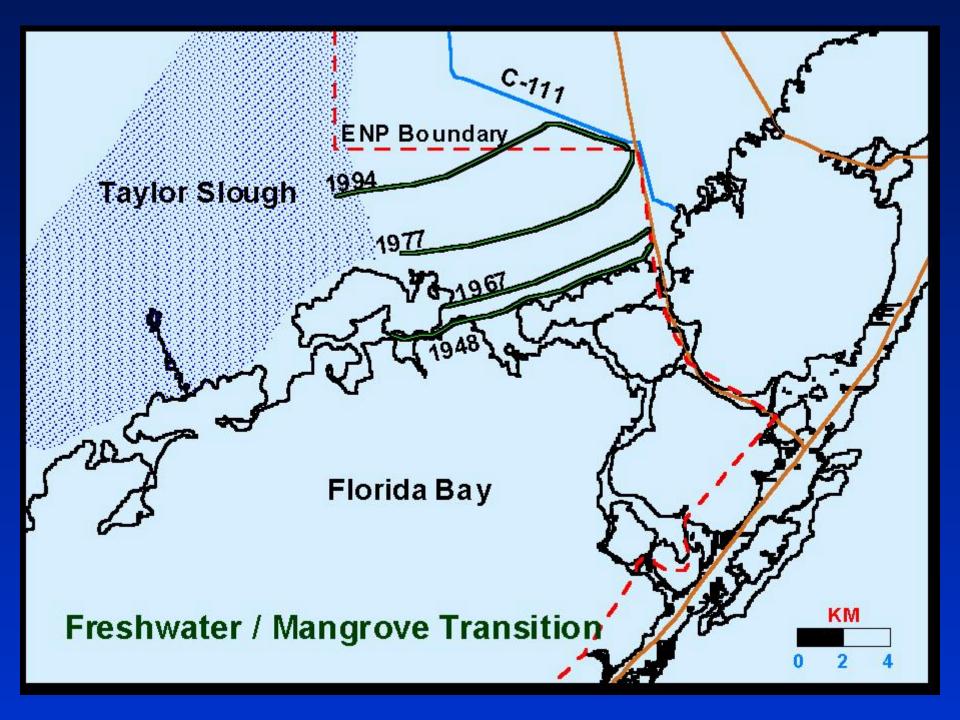
C. Mid Dry Season

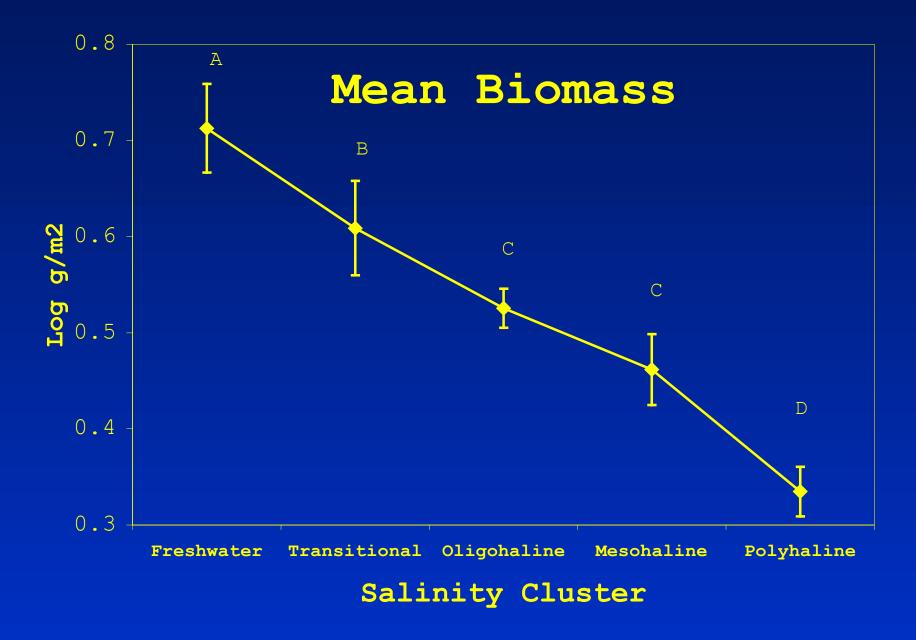


D. Late Dry Season









### Evaluation of Recent Operations

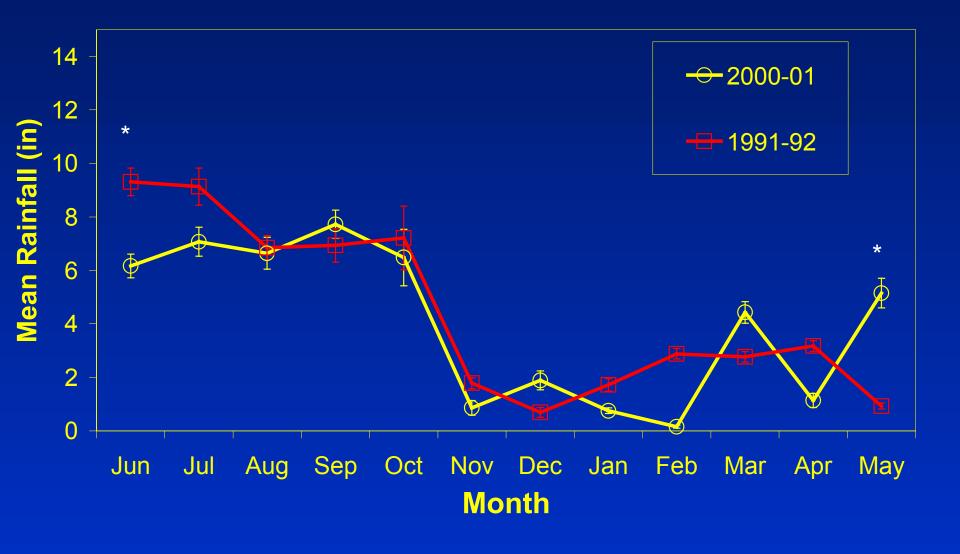
#### 1991-92

- Below Average Rainfall
- Test 5 EPWD
- Height of Florida Bay Turmoil

#### <u>2000-01</u>

- Below Average Rainfall
- ISOP 2001
- Most Recent Year

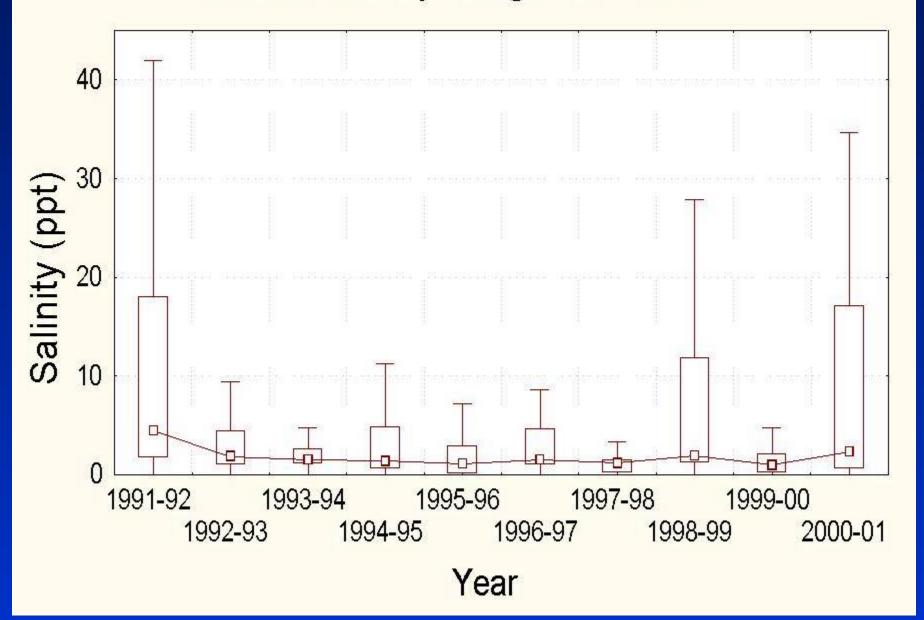
#### Rainfall Comparison



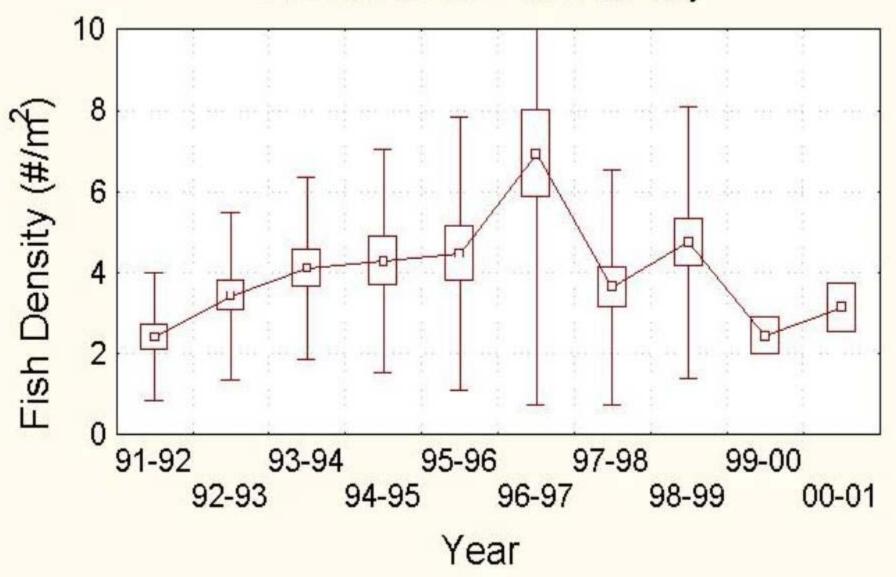
### Salinity Comparison



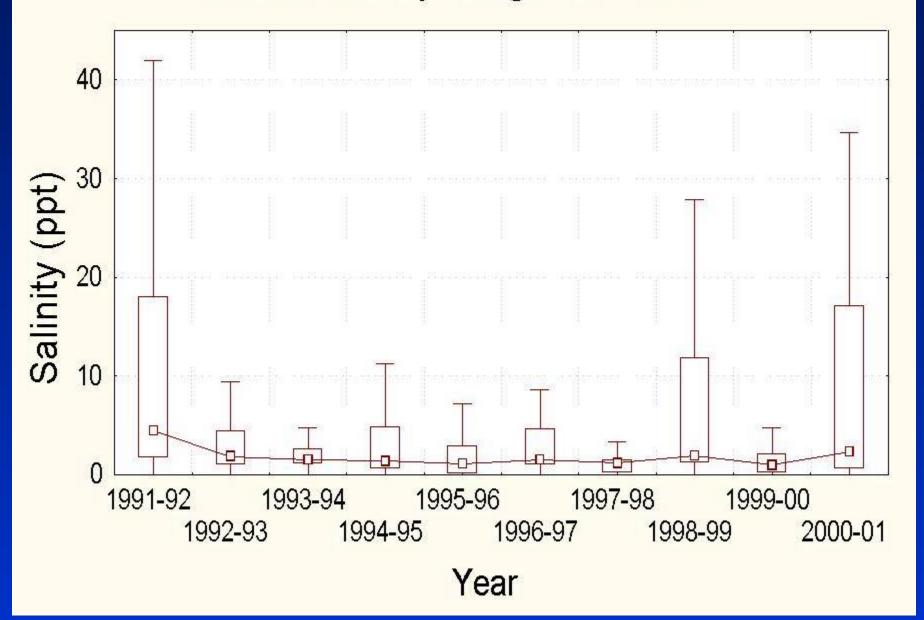
#### Annual Salinity Range 1991-2001



#### Annual Mean Fish Density



## Annual Salinity Range 1991-2001



JOHN S. KNIGHT (1894-1987)

JAMES L. KNIGHT (1909-1991)

ROBERTO SUAREZ

DAVID LAWRENCE JR. Publisher and Chairman JIM HAMPTON

DOUGLAS C. CLIPTON Executive Editor

MARTHA MUSGROVE and TONY PROSCIO

Managing Editor

## Florida Bay: Catastrophe

NE BY ONE, Florida's best-known bays have suffered terribly at the hands of man. The insidious processes of dying in each bay have gone on unimpeded until scientists, fishermen, and other bay users command media attention. When the news stories appear, with their devastating data and photos of a bay dying, the cry rises: Do something!

It happened to Biscayne Bay, once described as a "sewer," and to Tampa Bay. It's still going on in Apalachicola Bay, where an upstate water war could destroy that bay's great marine nursery. For some time The Herald has been saying that it is also happening in Florida Bay - fishing playground for presidents, rich reservoir for commercial fishermen, lush haven for birds, glorious sanctuary for boaters.

Biscayne and Tampa bays, thanks to federal, state, and local efforts, are recovering. Apalachicola's fate remains uncertain. Florida Bay is becoming a huge dead zone.

When healthy, Florida Bay is less saline than the ocean. Now slime and algae cloud its once clear waters, where sea grass waved gently in the current. That sea grass, which nurtures so much marine life. is dying in awesome proportions. Slimecovered grass covers an area the size of Miami and Coral Gables combined.

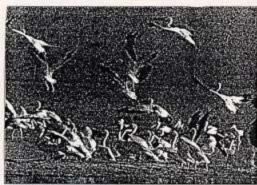
Scientists believe that diversion of the bay's fresh water inflow for development and farming may be the cause. The terrible rony here is that the fresh water is diverted, mainly via the C-111 Canal, into the Atlantic Ocean side of the Keys, where it upsets the balance of fresh and salt waters in Barnes Sound, causing more havoc. And now scientists think that the unnaturally high salinity in Florida Bay is pushing abnormally warm water south onto coral reefs. Coral are living organisms that cannot withstand these changes.

What catastrophe! Worst thing is, the scientists only think that the bay's dead zone is caused by lack of fresh water. Too many "maybes" add up to no response to the public's cry to "Do something!" Time will pass, too much time, before remedies are sought for this disgraceful killing.

Right now, before this congressional session ends, U.S. Rep. Dante Fascell one of the greatest friends of South Florida's ecology - must find federal dollars for research on what is killing Florida Bay. It would be a fine farewell gift.

Equally imperative, the South Florida Water Management District must address Florida Bay's demise more comprehensively. Must the district be reminded that the bay is included in its SWIM plan? It is every bit as viable a part of the Everglades ecosystem as is Lake Okeechobee.

It is time to proceed with the U.S. Army Corps of Engineers' design plan to modify the C-111 Canal, redirecting fresh water away from where it is unwelcome and back to the bay. Stop strangling Florida Bay!



## Saltier Florida Bay worries fishermen

### FLORISABAY, FRIDA 14

"Floride Hay a chargery live sides to marce lagour - room s page where tends and soft was a march order tends and soft was - streeting to Universal of Virginia name researcher Jay Evenue, who The converge suit was those an practs ago has been replaced to recenting different. "Missistally, it then have been

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tiwer water, gamen patovistans and take to conveying flore; the last frame up fort. Peak temperatures with stoop service degrees, higher share

By 1987, the green was doing to large switch By 1988, 5,000 acres were dead and another 10,000 were dong Tomer, past offereds extended sectivities), though once types of an groups are beginning to gree his b

The culted serves to be a county Nation of high will and high removes torns. Zessen concluded. More se-miliars studying the lan new believe its troubles show born a combine tion of samulal factors and human compensate with the factors water

### Keys poliution discounted

The appendix by several studies show water pollutein from the Pitoroth Keye in not to those. Though towage and highway runtiff have before careful toma Keye careful. the effects seem to stop a few hard and parts obtains from the related them. Turner and others and

Street of the sale, they was seen Variational Sangar to writing by a massive resource that fai-lands. When a harmonic or a brain tot down the C-LLI conditions are gie spor, fatally shorteng fight the were edupore to much taken condi-cate. Scientists support sciental ractes or the others, but they Agenn's studied the modesty. Setall, and the finhermen remain



### ARE THE SPOONBILLS LEAVING THE BAY?

Planeary spoonbox need by swipping their totals or the water and singuishing up singuished manufacture against their incomes high concentrations of fact or smarl approximately against their insurance of fact or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fact of their insurance or smarl approximately against the fac perk omittologist John Öggen. Those conditions are hard to lind in the bay make days, so the over our moving west to keys near Cape Sable

### ARE THE CROCODILES DESERTING THE CREEKS?

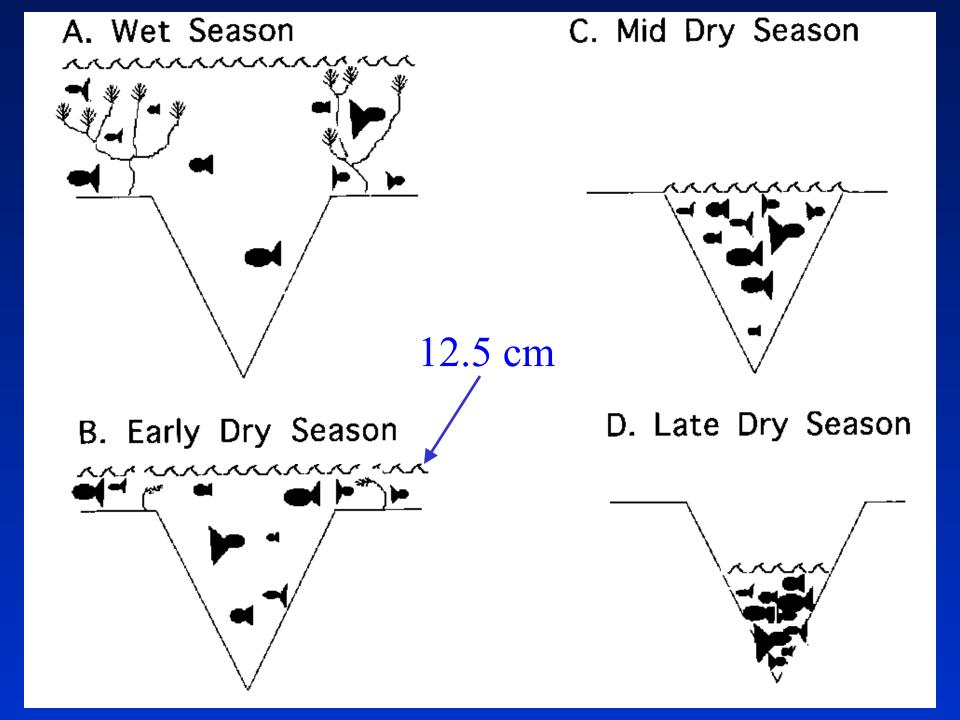
The endangered American oraciditie shoet is not along the tiarries of the installent beyon removed. The the opening are closely in short the index and the removes in staffic of the days, triggers self-like a subject or tolkings they have been been partial.

Sea principper usy Zietan roma na navaure eart works horhomatures are causing the granues in broutle in a focus rate, but they can't make enough little frequent protopy of their little with Tal rights treative use. "I know positive # **ARE SOME MANCROVES DYING?** There is a problem with mangioves but we're not ever what it is," says park retem only he had been when dying rigroves livel became abveys in the write or 1999 90 scorning partiets aterrory. Industry the Constitut heads of 1999 and Articl trees, Feyn. Oppositions partie saving sively, may be see high even for the but reven



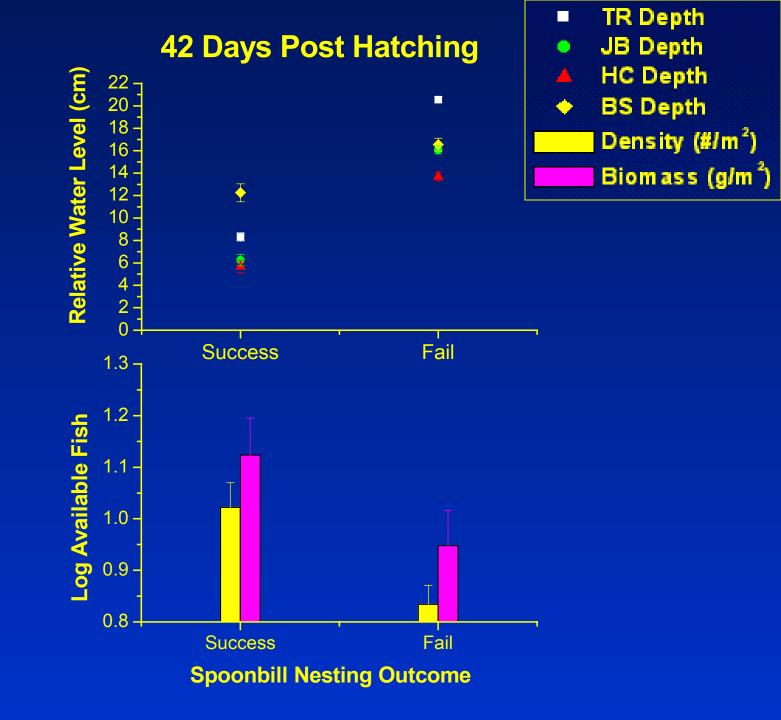
# CAUTION: Timing is everything.

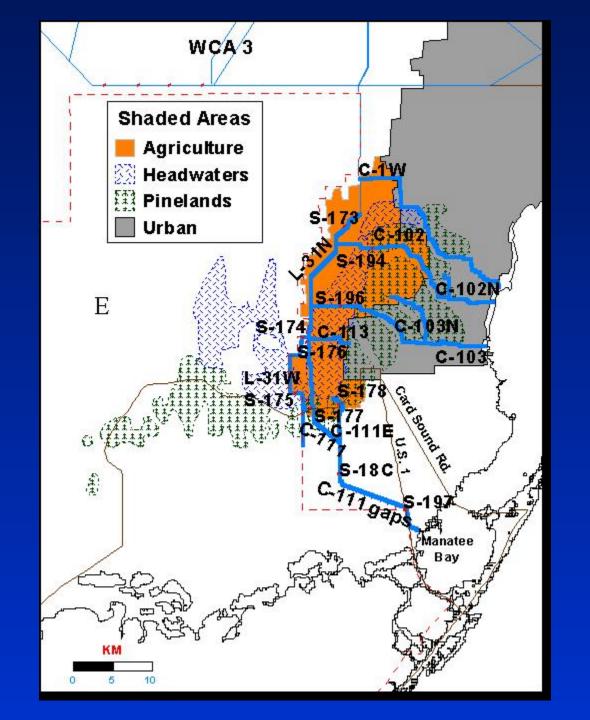
Can't justify the dumping of water into the bay with the claim that it will lower salinity

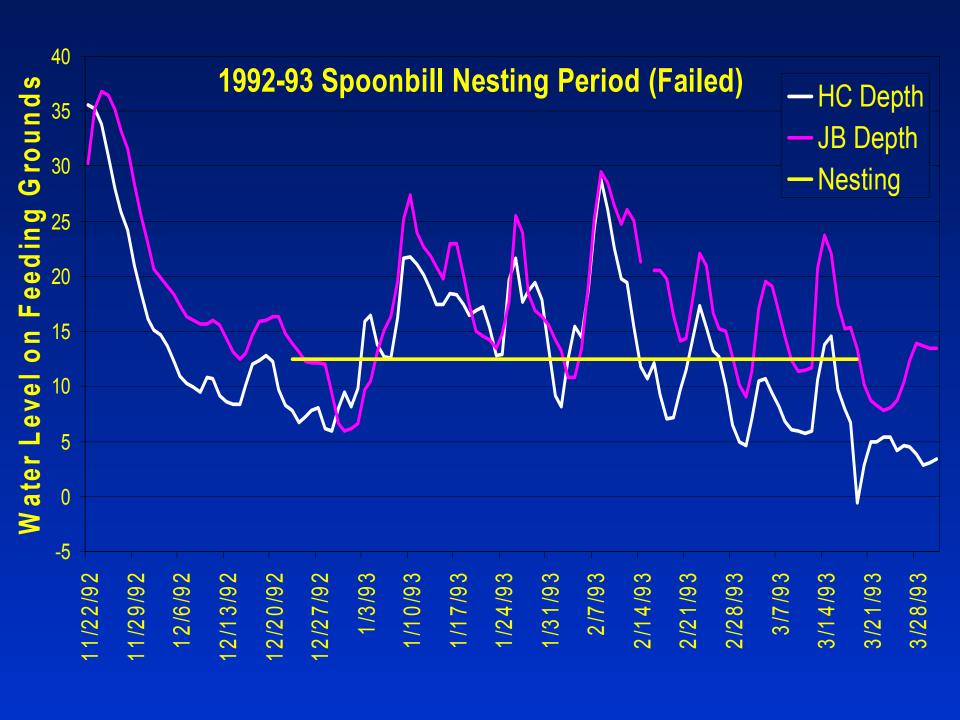




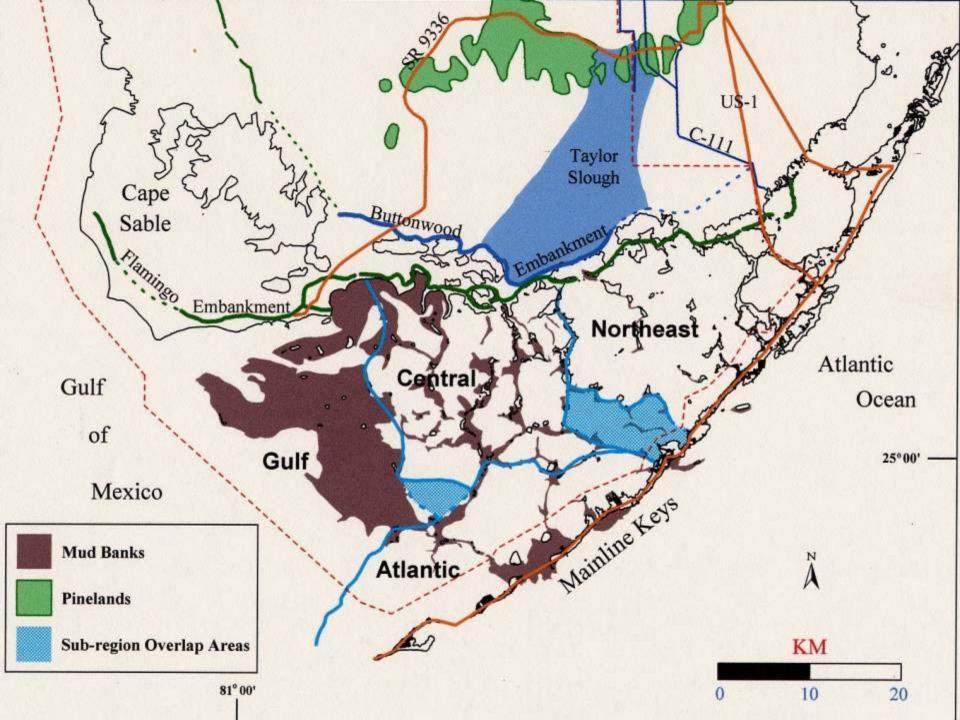












## Model: Seasonal Variation in Water Level

- Natural variation: hi water in wet season, low water in dry season
  - Best scenario for spoonbills
- Low wet, low dry = sustainable population?
- Low wet, hi dry = failure
- Reversals are lethal!